

Abstract

One of the most significant safety concerns in the automation of extracorporeal blood treatments such as dialysis is the risk of blood leakage. Extracorporeal
5 blood treatment systems draw blood at such a high rate that a loss of integrity in the blood circuit can be catastrophic. There are a number of mechanisms for
detecting and preventing leaks, *and for air embolisms*, but none is perfect. According to the present invention, the probability of a
10 leak, its seriousness, the amount of time the leak condition has persisted without a response, and other factors may be used to control escalation of multiple types of alarms. In a simple embodiment, for example, there may
be a staged audio signal that has a certain loudness, *frequency, and* and
15 tonal quality when a leak is first detected and becomes more conspicuous as time goes by without a reset response from a user.

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